

**COURSE SYLLABUS**  
**Academic Year: 2021/2022**

Identification and characteristics of the course			
Code	501973	ECTS Credits	6
Course title (English)	Food Hygiene and Safety II		
Course title (Spanish)	Higiene y Seguridad Alimentaria II		
Degree programs	Veterinary Sciences		
Faculty/School	Faculty of Veterinary Sciences		
Semester	Eighth	Course type (compulsory/optional)	Compulsory
Module	Hygiene, Technology and Food Safety		
Subject matter	Food Hygiene and Safety		
Lecturer/s			
Name	Room	E-mail	Web page
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Subject Area	Nutrition and Food Science		
Department	Animal Production and Food Science		
Coordinator (Only if there is more than one lecturer)	Miguel A. Asensio		

Competencies*	
<b>Basic skills</b>	
CB3: The students should be able of gathering and understanding relevant data to make professional judgements, including a careful thought on important social, scientific, or ethical issues.	
CB4: Ability of the students to communicate information, ideas, problems, and solutions to both specialized and unskilled public.	
CB5: Development of the skills needed to undertake further studies with a high degree of autonomy.	
<b>General skills</b>	
CG1: Hygiene, inspection, and food processing control from primary production to consumers.	

\* The sections concerning competencies, course outline, teaching activities, teaching methodology, learning outcomes and assessment methods must conform to those included in the ANECA verified document of the degree program.



## **PART I. MEAT AND MEAT PRODUCTS**

### **Lesson 1. *Ante-mortem* inspection.**

Factors influencing the hygienic quality of meat. Implementation of the HACCP system for meat processing and rendering. Process and criteria for *ante-mortem* inspection of animals. Food chain information. Health certificate for live animals. Emergency slaughter.

### **Lesson 2. Transport of livestock to slaughterhouses.**

Animal welfare during transport. Planning and requirements for transporters. Animal handling. Transporters and means of transport. Cleaning and disinfection of vehicles.

### **Lesson 3. Slaughterhouses.**

Main facilities and requirements. Plant layout and design. Requirements for rooms and premises. Requirements for equipment and supplies. Flow diagram for livestock slaughter.

### **Lesson 4. Protection of animals at the time of killing.**

Obligations of operators raising animals for slaughter. Reception, unloading and handling of livestock. Identification, cleaning, and accommodation for animals. The importance of humane slaughter. Conditions for animal handling and restraining. Stunning. Indicators of consciousness or sensibility. Animal welfare competence and training programme.

### **Lesson 5. Meat hygiene practice.**

Hygienic bleeding. Slaughter prescribed by religious rites. Carcase dressing, dehairing, evisceration, splitting, and washing. Withdrawal of offal and other edible parts. Handling of Specified Risk Materials (SRM). Good Manufacturing Practices (GMP).

### **Lesson 6. *Post-mortem* inspection.**

Objectives and general requirements. Facilities for *post-mortem* inspection. The importance of lymph nodes in livestock *post-mortem* examination.

### **Lesson 7. Specific requirements for *post-mortem* inspection.**

Inspection procedures for the different types of livestock. Pathological features in the different livestock species. Visual inspection of domestic swine. Criterion for the decisions at the final judgement.

### **Lesson 8. Decision criteria for infectious diseases.**

Meats from animals suffering zoonotic and other infectious diseases. Requirements for control and eradication of Transmissible Spongiform Encephalopathies. Rapid tests. Inspection, conditions for slaughtering, and judgement.

### **Lesson 9. Decision criteria for parasitic diseases.**

Meats from animals with diseases caused by helminths or protozoa. Other parasitic diseases of interest for meat inspection. Inspection and laboratory tests for parasites. Decision criteria and judgement.

### **Lesson 10. Other pathological conditions.**

Meats from animals suffering metabolic diseases or nutritional deficiencies. Fever and septicaemia. Meats from immature or cachectic animals. Neoplasia. Haemorrhagic meats. Animals treated with unauthorized substances or containing residues in excess of the limits laid down. Characteristics, decision criteria and judgement.

**Lesson 11. Health marking and chilling of carcasses and offal.**

Health marks. Traceability. Quality marks. Chilling and refrigerated storage. Handling and transport. Veterinary certificates and inspection reports.

**Lesson 12. Poultry and lagomorph slaughter.**

*Ante-mortem* inspection. Requirements for poultry and lagomorph slaughterhouses. Stunning and slaughter. Scalding and defeathering of birds. Evisceration. Carcase chilling.

**Lesson 13. Inspection and official control concerning poultry and lagomorph meat.**

Main hazards. Harmonized epidemiological indicators. *Post-mortem* inspection and official auxiliary. Checks by the official veterinarian. Health certificates. Transport conditions.

**Lesson 14. Meat from animals not killed at slaughterhouses.**

Inspection and commercialization of farmed and wild game meat. Training of hunters in health and hygiene. Inspection of meats from bullfights. Pig slaughter for private consumption. Legal requirements

**Lesson 15. Microbiological analysis and carcase decontamination.**

Microbial contamination and distribution in carcasses and equipment. Sampling methods. Criteria for carcase hygiene evaluation. Decontamination treatments. Main characteristics of decontamination methods. Legal requirements.

**Lesson 16. Official controls with respect to meats.**

Audits of good hygiene practices. Audits of HACCP-based principles. Compliance with operating procedures to guarantee. Community legislation on chemical residues, contaminants and forbidden substances. Check of the records or documentation.

*Practical activities:* HACCP verification and auditing in slaughterhouses.

**Lesson 17. Carcase cutting.**

Requirements for cutting plants. Carcase and meat handling. Hygiene during cutting and boning. Primal and subprimal commercial cuts. Main muscles in primal and subprimal commercial cuts.

**Lesson 18. Inspection of cold preserved meats.**

Chilled meats, minced meat, meat preparations, mechanically separated meat: microbiology, microbial growth, and spoilage. Frozen meats: alterations. Prevention and control. Inspection techniques. Distinction between chilled and frozen meat.

**Lesson 19. Conditions for production and marketing of meat products.**

Types of meat products. Hygienic and sanitary conditions for facilities and equipment in meat products processing plants. HACCP implementation. Fresh processed meat products. Microbiological criteria. Spoilage and adulterations.

**Lesson 20. Control of cured meat pieces.**

Dry-cured ham. Agents involved in preservation. Microbiology. Curing agents. Quality standards. Spoilage and adulterations. Methods for prevention and control. Control of ripening time. HACCP implementation. *Practical activities:* Verification and auditing HACCP plans for dry-cured ham.

**Lesson 21. Control of dry-cured fermented sausages.**

Microbiology. Agents involved in preservation. Curing agents. Spoilage. Prevention and control methods. Quality standards. HACCP implementation.  
*Practical activities:* Determination of mycotoxins by chromatographic methods in ripened foods. Immunoenzyme assay for aflatoxin detection. Verification and auditing HACCP plans for dry-cured fermented sausages.

**Lesson 22. Heat-treated meat products.**

Pasteurized and sterilized meat products. Other processed meat products. Production conditions. Characteristics. Microbiology. Quality standards. Alterations, adulterations, and inspection. HACCP implementation.  
*Practical activities:* Quantification of sulphite-reducing *Clostridium* in cooked meat products.

**PART II. FISH AND FISH PRODUCTS.**

**Lesson 23. Requirements for harvesting and placing on the market of fresh fishery products.**

Characteristics and requirements for vessels and establishments handling fishery products. Requirements during and after landing. Technical measures to manage fish stocks. Minimum landing sizes. Scientific names and commercial designations. Identification of fishery products.

**Lesson 24. Health standards for fishery products and molluscs.**

Impact of fishing methods on fish quality. Microbiology. Organoleptic properties. Freshness criteria. Laboratory testing. Biosensors. Criteria for safety evaluation.

*Practical activities:* Total Volatile Basic Nitrogen determination in fish and fish products.

**Lesson 25. Hazards related to fish and shellfish.**

Main hazards in fish and fishery products: chemical residues, marine toxins, pathogenic microorganisms, and parasites. Inspection requirements concerning parasites. Importance of food habits. Prevention and control in fresh fish.

**Lesson 26. Monitoring of bivalve molluscs.**

Requirements for production areas. Relaying. Purification. Conditioning and depuration and its verification.

*Practical activities:* Coliforms and *Escherichia coli* counts.

**Lesson 27. Processed fishery products.**

Requirements for processed fishery products. Prevention and control of hazards in processed fishery products. Microbiological criteria. Wrapping and packaging. Labelling of fishery products. Storage and transport.

**PART III. MILK AND DAIRY PRODUCTS.**

**Lesson 28. Hygiene of milking and handling of raw milk.**

Microbial contamination of raw milk. Characteristics of milk from sick animals. Environmental contaminants. Residues of antibiotics, hormones, and cleaning and disinfecting compounds. Health requirements for raw milk production. Hygiene on milk production holdings: requirements for premises, equipment, and staff. HACCP implementation.

**Lesson 29. Assessment of milk quality.**

Microbial quality of raw milk. Hygienic quality assessment of raw milk. Antimicrobial systems in milk. Psychrotrophic microbial population. Physicochemical properties of milk related to inspection. Enzymes and

somatic cells in milk inspection. Quality assessment of milk by composition and microbiology. Adulterations and their detection.

**Lesson 30. Drinking and concentrated milks.**

Conditions for raw milk marketing. Requirements for heat treatment. Safety requirements for drinking and preserved milks. Microbiological criteria, prevention, and control in drinking and preserved milks. HACCP implementation.

**Lesson 31. Fermented milks and cheeses.**

Hygienic conditions for yoghurt, curd cheese, cheeses, whey, buttermilk, casein and caseinates. Spoilage and adulteration. HACCP implementation. *Practical activities:* Detection of *Listeria monocytogenes* by culture-based methods and molecular techniques in ready to eat foods. Verification and auditing HACCP plans for dry-ripened cheese.

**Lesson 32. Other dairy products.**

Hygienic conditions for cream, butter, ice cream, shakes and dairy desserts. HACCP implementation.

**PART IV. OTHER FOODS FROM ANIMAL ORIGIN AND FOOD ESTABLISHMENTS.**

**Lesson 33. Eggs.**

Natural antimicrobial systems. Egg quality and freshness evaluation. Microbiology. Characteristics and commercial classification. Requirements for egg grading and storing facilities. Inspection techniques. *Practical activities:* Egg quality evaluation.

**Lesson 34. Egg products.**

Requirements for processing plants. Egg and egg products packaging and transport. Effect of processing on microorganisms. Spoilage and adulterations. HACCP implementation.

**Lesson 35. Honey.**

Quality standard. Toxic honey. Changes during honey storage. Other apiculture products. Alterations and adulterations. HACCP implementation. Inspection and control. *Practical activities:* Moulds and yeasts counts in intermediate moisture foods. Determination of hydroxymethylfurfural in honey.

**Lesson 36. Retail trade, prepared meals, and mass-catering industries.**

Hygienic requirements and conditions to be fulfilled. Prepared meals, ready-made foods, and food preparations. Characteristics, hygienic and microbiological standards. Food preparation and distribution for catering. Requirements for ready-to-eat food vending machines. Hygiene regulations and redistribution of surplus food. HACCP implementation.

*Practical activities:* Verification and auditing HACCP plans for catering services.

Educational activities *								
Student workload (hours per lesson)		Lectures	Practical sessions				Monitoring activity	Homework
Lesson	Total	L	HI	LAB	COM	SEM	SGT	PS
1	2.9	0.9						2
2	2.9	0.9						2
3	2.9	0.9						2
4	2.9	0.9						2
5	2.9	0.9						2
6	2.9	0.9						2
7	2.9	0.9						2
8	2.9	0.9						2
9	2.9	0.9						2
10	2.9	0.9						2
11	2.9	0.9						2
12	2.9	0.9						2
13	2.9	0.9						2
14	2.9	0.9						2
15	2.9	0.9						2
16	11.9	0.9		2		1		8
17	2.9	0.9						2
18	2.9	0.9						2
19	2.9	0.9						2
20	7.9	0.9		1.5		0.5		5
21	9.4	0.9		3		0.5		5
22	4.4	0.9		1.5				2
23	2.9	0.9						2
24	4.4	0.9		1.5				2
25	2.9	0.9						2
26	4.4	0.9		1.5				2
27	2.9	0.9						2
28	2.9	0.9						2
29	2.9	0.9						2
30	2.9	0.9						2
31	10.4	0.9		3.5		1		5
32	2.9	0.9						2
33	3.9	0.9		1				2
34	2.9	0.9						2
35	4.9	0.9		2				2
36	8.4	0.9		1.5		1		5
<b>Assessment **</b>	4.6	2.6		1		1		0
<b>TOTAL ECTS</b>	150	35		20		5		90
L: Lectures (100 students) HI: Hospital internships (7 students) LAB: Lab sessions or field practice (15 students) COM: Computer room or language laboratory practice (30 students) SEM: Problem-solving classes, seminars or case studies (40 students) SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials) PS: Personal study, individual or group work and reading of bibliography								
<b>Teaching Methodology*</b>								

\*\* Insert as many rows as necessary. For instance, you can include one row for a partial exam and another for the final exam.

### 1. Large lecture classes

The theoretical programme is taught in a single group. At the end of each class, a short answer question can be asked to assess students' conceptual and procedural knowledge.

### 2. Laboratory practice

Laboratory practice is carried out in the laboratory of Food Hygiene and Safety. Students will write down individually their own results in the laboratory manual and notebook. At the end of each session, knowledge will be assessed by a short answer question.

The laboratory manual and notebook can be downloaded from the Campus Virtual. Students will wear their lab coat during laboratory practice. Any other personal protective equipment, including safety glasses, gloves, masks, etc., will be provided by the University as required. Students are required to comply with laboratory safety rules, which are provided the first day of lab.

### 3. Practical training in food premises

These are supervised practical activities on slaughterhouses and other food premises.

Students, accompanied by a teacher or an Official Inspector, take part in relevant official inspection activities and verification of HACCP system. Students must abide by all rules and confidentiality policy in place at the host company.

### 4. Directed work (seminars)

Seminars are focused on auditing HACCP systems in slaughterhouses and other food premises. Each student should submit a report with a critical evaluation of the HACCP system. All reports will be individually explained and discussed in small groups under the supervision of a teacher.

### 5. Non-classroom activities.

These activities will include:

- Writing a report with all data and information collected for the verification of the HACCP program at a slaughterhouse.
- Preparing the presentation of the verification and auditing of the HACCP program.
- Exam preparation.

### Learning outcomes \*

The students will be competent to:

- Evaluate animal health and welfare conditions for transport and killing of animals intended for human consumption.
- Carry out ante- and post-mortem inspection of animals slaughtered for human consumption.
- Assess the fulfilment of hygienic and health requirements set by the European Union to obtain, process, distribute, and store foods of animal origin.
- Detect and quantify hazards in foods of animal origin and evaluate the observance of European Union regulations.
- Evaluate defects, adulterations, and frauds in food of animal origin, and make the appropriate decisions.



- Carry out inspection and sampling in food establishments that handle foods of animal origin.
- Render a decision on the fitness of food from animal origin for human consumption.
- Audit prerequisite and HACCP programmes for establishments that process, store or distribute foods of animal origin.
- Evaluate the conditions of establishments and products related to retail trade, prepared meals and catering.

#### Assessment methods \*

Under the **continuous evaluation system**, understanding and skills gained are evaluated by short tests in classroom teaching. Laboratory work is evaluated through the lab notebook and daily tests. The work carried out in seminars is evaluated through the work carried out and during the oral presentation. Knowledge from personal study is evaluated by written exams.

Scheduled written exam consist of 20-30 short-answer questions. Just for disabled students, written exams will be adjusted to multiple choice tests with a penalty of 33 % for wrong answers.

Students not reaching a mark of 5,0 for the laboratory or seminar work will be allowed to take a make-up exam at the final written exam, which will include specific make-up tests for the missed requirements (*i.e.*: lab work and seminar). Make-up tests for in-class theoretical learning will not be permitted.

Lab work or seminar successfully completed will be kept if the student so wishes.

**Marking.** The overall score is calculated from both classroom teaching and non-classroom activities according to the following pattern:

- **Classroom teaching** (32%):

- Large lecture classes: 10%
- Laboratory tests: 5%
- Laboratory notes and report: 7%
- Oral presentation of the seminar assignment: 8%
- Seminars: 2%.

- **Non-classroom activities** (68%):

- Written exams to evaluate students' knowledge and skills: 60%
- Students' compliance with their assigned task: 8%.

To pass the course, a minimum mark of 5.0 must be reached in the following learning activities: lab work, seminars, and theoretical knowledge. The final score earned is calculated as the weighted average mark.

A system of continuous assessment is followed, except for those applying for the global evaluation system. This application will be submitted within the allotted time frame through the online form at the web page of the subject in the Campus Virtual. Students applying for the **global evaluation system** will sit a single written examination comprising knowledge and comprehension questions, as well as problem-based questions for both laboratory work and HACCP-program auditing. The final grade is calculated from the weighted mark obtained as follows: theoretical questions 70%, laboratory questions 12%, and auditing questions 18%.

The current grading system of the Universidad de Extremadura will be applied.

### Bibliography (basic and complementary)

**Basic bibliography**

Collins, D.S. and Huey, R. (2015). *Gracey's Meat Hygiene* 11<sup>th</sup> ed. Wiley Blackwell, Oxford.

**Complementary bibliography**

**MEAT AND MEAT PRODUCTS**

FAO (2004). *Animal production and health, manual 2: Good practices for the meat industry*. FAO, Rome.

Grist, A. (2007). *Porcine Meat Inspection: Anatomy, Physiology and Disease Conditions*. Nottingham Univ. Press, Thrumpton.

Grist, A. (2008). *Bovine Meat Inspection*. 2<sup>nd</sup> ed. Nottingham Univ. Press, Thrumpton.

Ninios, T., Lundén, J., Korkeala, H. and Fredriksson-Ahomaa, M. (2014). *Meat Inspection and Control in the Slaughterhouse*. Wiley, Chichester.

Paulsen, P., Bauer, A., Vodnansky, M., Winkelmayr, R. and Smulders, F.J.M. (2011). *Game meat hygiene in focus: microbiology, epidemiology, risk analysis and quality assurance*. Wageningen Academic Publishers, Wageningen.

E-book at: <https://campusvirtual.unex.es/zonaux/evuex/mod/url/view.php?id=332162>

Warris, P. (2010). *Meat Science: an introductory text*. 2<sup>a</sup> ed. CAB International, Wallingford.

Wilson, W.G. (2005). *Wilson's practical meat inspection*. 7<sup>th</sup> ed. Blackwell, Oxford.

**FISH**

Sumner, J., Toss, T. and Ababouch, L. (2004). *Application of risk assessment in the fish industry*. FAO, Rome.

**MILK AND DAIRY PRODUCTS**

Fernandes, R. (2009). *Microbiology Handbook: Dairy products*. Leatherhead Food International & Royal Society for Chemistry, Oxford.

Fuquay, J.W., Fox, P.F. and McSweeney, P.L.H. (2011). *Encyclopaedia of Dairy Sciences* (4 vols.). 2<sup>nd</sup> ed. Academic Press, London.

Knovel, G.S. (2003). *Dairy Processing: Maximising Quality*. Woodhead Publishing, Cambridge.

Varnam, A.H. and Sutherland, J.P. (2001). *Milk and Milk Products: Technology, Chemistry, and Microbiology*. Springer, New York.

Wehr, H.M. and Frank, J.F. (2004). *Standard Methods for the Examination of Dairy Products*. American Public Health Association, Washington.

### Other resources and complementary materials

Class presentations, lab notebook, and model forms for the seminars will be available for the students through the Campus Virtual.

**Sources for further information:**

European Union Legislation: <http://eur-lex.europa.eu/es/index.htm>

Spanish Legislation: [http://www.boe.es/g/es/bases\\_datos/iberlex.php](http://www.boe.es/g/es/bases_datos/iberlex.php)

Scientific literature: <http://www.scopus.com>

FAO: <http://www.fao.org>

EFSA: <http://www.efsa.europa.eu>

AESAN: <http://www.aesan.gob.es>